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**JP 2000156525 A**

**TITLE:** THIN AND UNIFORM LIGHTING DEVICE USING A  
PLURALITY OF LEDS

**PUBN-DATE:** June 6, 2000

**INVENTOR-INFORMATION:**

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<b>NAME</b>	<b>COUNTRY</b>
KYOTO DENKIKI KK	N/A

**APPL-NO:** JP10374917

**APPL-DATE:** November 19, 1998

**INT-CL (IPC):** H01L033/00

**ABSTRACT:**

**PROBLEM TO BE SOLVED:** To efficiently generate a thin and uniform surface light emission by mounting an LED chip that can apply light in all directions on an upper surface onto a printed-wiring board, mixing powder with diffusion effect or reflection effect with resin, and performing resin molding to an entire LED chip-packaging surface.

**SOLUTION:** Straight light being emitted on an entire surface from each point of an LED chip 1 is diffused and irregularly reflected in a mold due to powder with diffusion effect or reflection effect being mixed into a resin mold 4 for enabling the entire mold to emit light. Also, light emitted from an area other than a lighting surface is applied to the inside of the mold again by reflection machining on the inner surface of a packaging surface/case 5 of the LED chip 1 to compensate for the attenuation of the quantity of light from an end part. The LED chip 1 is directly mounted onto a printed wiring board 2 for achieving cooling effect, and further cooling machining is executed to the printed-wiring board 2 and the case 5, thus improving emission efficiency per power.

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DERWENT-ACC-NO: 2000-437935  
DERWENT-WEEK: 200038  
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TITLE: Thin uniform flicker lamp using LEDs has fine particles  
with reflecting effect or diffusion effect that are mixed  
in resin mold provided on printed wiring board

PATENT-ASSIGNEE: KYOTO DENKIKI KK[KYOTN]  
PRIORITY-DATA: 1998JP-0374917 (November 19, 1998)  
PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 2000156525 A	June 6, 2000	N/A	003	H01L 033/00

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP2000156525A	N/A	1998JP-0374917	November 19, 1998

INT-CL (IPC): H01L033/00

ABSTRACTED-PUB-NO: JP2000156525A

BASIC-ABSTRACT:

NOVELTY - Fine particles (3) with a reflecting effect or a diffusion effect are mixed in the resin used as the mold material for the resin mold (4) provided on the entire LED chip mounting surface of a printed wiring board (2). The fine particles diffuses the radiated light from the LED chips (1) which are mounted directly on the wiring board.

DETAILED DESCRIPTION - The LED chips irradiate in all directions from the upper surface.

ADVANTAGE - Ensures more uniform surface emission though LED is a point light source. Reduces thickness and small attenuation of light quantity since diffusion board is not used. Enables illumination with low electric power and low heat generation since more than required electric power is not needed.

DESCRIPTION OF DRAWING(S) - The figure shows a cross-sectional view of the lamp.

LED chips 1

Printed wiring board 2

Fine particles 3

Resin mold 4

CHOSEN-DRAWING: Dwg.2/2

DERWENT-CLASS: U12

EPI-CODES: U12-A01A3;

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2000-156525

(P2000-156525A)

(43) 公開日 平成12年6月6日(2000.6.6)

(51) Int.Cl.<sup>7</sup>  
H 0 1 L 33/00

識別記号

F I  
H 0 1 L 33/00

テーム(参考)  
L 5 F 0 4 1

審査請求 未請求 請求項の数1 書面 (全 3 頁)

(21) 出願番号 特願平10-374917

(22) 出願日 平成10年11月19日(1998.11.19)

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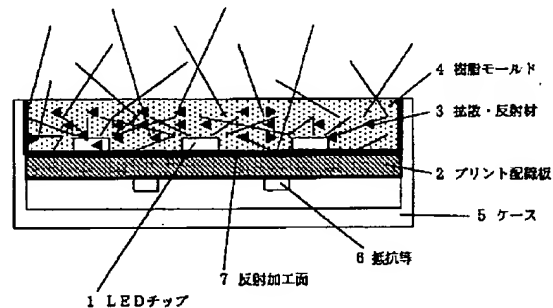
Fターム(参考) 5F041 AA05 AA07 AA33 CA12 DA13  
DA20 DA43 DA46 DA78 DA82  
DB09 FF11

(54) 【発明の名称】 複数個のLEDを使用した、薄型均一光照明装置

(57) 【要約】

【課題】 複数個のLEDで構成される照明装置において、拡散板を使用せずに、モールドによる薄型の形状で、均一な面発光を効率よく発生させる。

【解決手段】 上面全方向に照射可能なLEDチップ(1)をプリント配線板(2)に実装した後、拡散効果、又は反射効果のある粉体(3)を樹脂に混ぜ合わせたもので、LEDチップ実装面全体に樹脂モールド(4)を施す。



## 【特許請求の範囲】

【請求項1】 プリント配線板上に、複数のLEDチップを直接実装し、プリント配線板の全体に樹脂モールドを施す。モールド材として使用する樹脂には、反射効果、又は拡散効果のある粉体を混入し、LEDからの放射光を混入された粉体により、乱反射・拡散させ、点光源であるLEDの集合体でありながら、モールド照射面全体よりの、均一な面発光を可能とする方式。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明はモールド内で反射・拡散機能を有するLED照明装置に関するものである。

## 【0002】

【従来の技術】 複数のLEDを使用して、構成される照明装置は、個々のLEDチップが、点光源的な発光であるが為に、点発光による直線的な放射の状態から、照度ムラが発生しやすく、均一化を図るためには、LED前面に拡散板等を設置し、LED・拡散板間は、隣接するLEDの光が重なり合うまでの距離が必要とされていた。また、より均一にするには、拡散板を厚くするか、拡散板の透明度を濃くしなければならず、光量の減衰を余儀なくされ、減衰分を補う為に、さらにLEDの光量を明るくすることが必要となる。光量の増加に伴って、消費電力と発熱量も増加し、照明器具や、周辺の温度を上昇させる。また、電力あたりの発光効率も低下するという問題がある。

## 【0003】

【発明が解決しようとする課題】 本発明は、複数のLEDで構成される照明装置において、拡散板を使用せずに、薄型の形状で、均一な面発光を効率よく発生させる事を目的としている。

## 【0004】

【課題を解決するための手段】 上記目的を達成する為に、上面全方向に照射可能なLEDチップ(1)をプリント配線板(2)に実装した後、拡散効果、又は反射効果のある粉体(3)を樹脂に混ぜ合わせたもので、LEDチップ実装面全体に樹脂モールド(4)を施す。電流の制限に使用する、チップ抵抗(6)等の付属する部品は、同一面に実装すると、影が発生させ、輝度ムラの原因となる為、裏面に配置する。また、照射面以外のモールド部を囲むケース(5)の内面・LED実装面を、反射効果(7)のある状態に加工する。尚、この状態で使用するLEDチップ(1)は、全方向に照射できる、ベ

アチップ状の素子か、リフレクター・集光レンズの無いチップ型LEDを使用する。

## 【0005】

【発明の実施の形態】 LEDチップの各点より、全面放射された直線的な光が、樹脂モールド内に混入された、拡散効果、又は反射効果のある粉体によって、モールド内で拡散・乱反射されることにより、モールド全体の発光とする。

【0006】 また、照射面以外に出光する光を、LEDチップ実装面・ケース内面の反射加工によって、再度モールド内部に入光し、端部より光量減衰を補う。

【0007】 LEDチップをプリント配線板に直接実装することによって放熱効果を有し、さらにはプリント配線板・ケースに放熱加工を施すことで、電力あたりの発光効率の向上を可能とする。

## 【0008】

【発明の効果】 本発明は、以上の説明の様に構成され、以下に記載される効果を有する。点光源であるLEDを、複数使用しする照明装置の照射面上で、従来より均一な照度分布を実現できる。

【0009】 樹脂モールド内に混入された粉体により、拡散・乱反射効果を得ることによって、従来必要とされていた、拡散板と、LED素子・拡散板の間(各個LEDの照射角の広がりにより、隣接されるLEDの照射光が、重なり合うまでの距離)のスペースが省略され、薄型で形成することが可能になる。

【0010】 拡散板を使用しない為、均一化による光量の減衰が少なく、照明効率が向上する。また、必要以上の電力を必要としない為、低電力・低発熱の照明を可能とする。

## 【図面の簡単な説明】

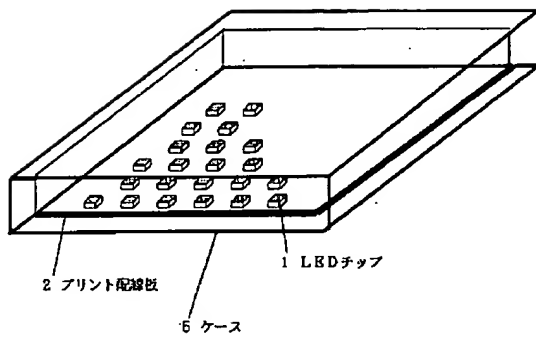
【図1】 複数のLEDを使用し、全面モールドを施した灯具の構成図である。

【図2】 複数のLEDを使用し、全面モールドを施した灯具の縦断面図である。

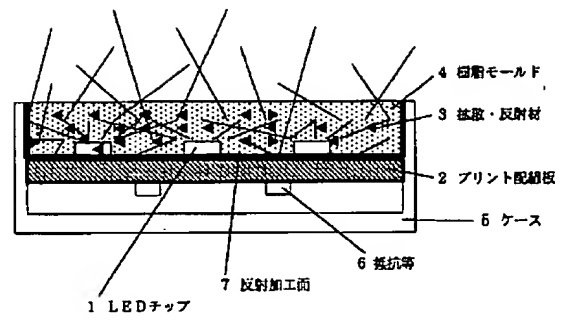
## 【符号の説明】

- 1 LEDチップ
- 2 プリント配線板
- 3 拡散・反射材
- 4 樹脂モールド
- 5 ケース
- 6 抵抗等
- 7 反射加工面

【図1】



【図2】



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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the LED lighting system which has echo / diffusion function within a mold.

[0002]

[Description of the Prior Art] Two or more LED was used, and although each LED chip is point light source-luminescence, in order to be easy to generate illuminance nonuniformity in a sake and for the lighting system constituted to attain equalization from the condition of the linear radiation by point luminescence to it, the diffusion board etc. was installed in the front face of LED, and distance until the light of adjoining LED overlaps was needed between LED and a diffusion board. Moreover, in order to make it homogeneity more, to have to thicken a diffusion board, or to have to make the transparency of a diffusion board deep, to be obliged to attenuation of the quantity of light and to compensate a decreased part, it is necessary to make the quantity of light of LED bright further. With the increment in the quantity of light, power consumption and calorific value also increase and lighting fitting and a surrounding temperature are raised. Moreover, there is a problem that the luminous efficiency per power also falls.

[0003]

[Problem(s) to be Solved by the Invention] In the lighting system which consists of two or more LED, without using a diffusion board, this invention is a thin configuration and aims at generating uniform field luminescence efficiently.

[0004]

[Means for Solving the Problem] In order to attain the above-mentioned object, after mounting an LED chip (1) which can glare in all the upper surface directions in a printed wired board (2), it is what mixed \*\*\*\* (3) with a spreading effect or a reflection effect with resin, and a resin mold (4) is given to the whole LED chip component side. If components which are used for a limit of current and which are [ chip resistor / (6) ] attached are mounted in the same field, since they will generate a shadow and will cause brightness nonuniformity, they are arranged at the rear face. Moreover, an inner surface and an LED component side of a case (5) surrounding the mold sections other than an exposure side are processed into the condition that there is a reflection effect (7). In addition, an LED chip (1) used in this condition uses the chip mold LED without bare chip-like an element, and a reflector and a condenser lens which can glare in all the directions.

[0005]

[Embodiment of the Invention] From each point of an LED chip, a linear light emitted completely considers as luminescence of the whole mold diffusion and by carrying out scattered reflection within a mold by \*\*\*\* with a spreading effect or a reflection effect mixed in the resin mold.

[0006] Moreover, ON light of the light which acts as Idemitsu in addition to an exposure side is again carried out to the interior of a mold by reflective processing of an LED chip component side and a case inner surface, and quantity of light attenuation is compensated from an edge.

[0007] By mounting an LED chip in a printed wired board directly, it has the heat dissipation effect and improvement in the luminous efficiency per power is enabled by performing heat dissipation processing to a printed wired board and a case further.

[0008]

[Effect of the Invention] This invention is constituted like the above explanation and has the effect indicated below. Illuminance distribution more uniform than before is realizable on the exposure side of the lighting system which uses two or more LED which is the point light source.

[0009] the space between the diffusion board conventionally needed by acquiring diffusion and the scattered reflection effect by the fine particles mixed in the resin mold, and an LED element and a diffusion board (distance until the exposure light of adjoining LED overlaps by the breadth of the illuminating angle of an each LED) is omitted, and it becomes possible to form with a thin shape.

[0010] In order not to use a diffusion board, there is little attenuation of the quantity of light by equalization, and lighting effectiveness improves. Moreover, since power beyond the need is not needed, lighting of low power and low pyrexia is enabled.

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[Translation done.]

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CLAIMS

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[Claim(s)]

[Claim 1] On a printed wired board, two or more LED chips are mounted directly, and a resin mold is given to the whole printed wired board. A method which enables field luminescence more uniform than the whole mold exposure side by fine particles which fine particles with a reflection effect or a spreading effect were mixed [ fine particles ] in resin used as mold material, and had synchrotron orbital radiation from LED mixed though it is scattered reflection and the aggregate of LED which you make it spread and is the point light source.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the block diagram of the lighting fixture which used two or more LED and gave the whole surface mold.

[Drawing 2] It is drawing of longitudinal section of the lighting fixture which used two or more LED and gave the whole surface mold.

[Description of Notations]

- 1 LED Chip
- 2 Printed Wired Board
- 3 Diffusion and Reflector
- 4 Resin Mold
- 5 Case
- 6 Resistance Etc.
- 7 Reflective Processing Side

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[Translation done.]